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ABSTRACT

This longitudinal study examined the interrelationship between sex of the child and sex of the parent on the expression of attachment behaviors during the child's first 2 years. Special consideration was given developmental changes in the attachment structure and the relationship of attachment to cognitive development. Ten boys and 10 girls were seen at 1 and 2 years of age in a free play situation. At each age each infant first played with one parent and then a week later with the other. Attachment behavior (proximal and distal modes) was observed and found to be affected by the sex of infant and sex of parent. The Bayley Mental Maturity Index, obtained at age 2, was found to be correlated with certain patterns of attachment behavior over the first 2 years of life. These findings are discussed in terms of attachment theory and the etiology of sex differences in interpersonal relationships. (Author/SET)

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MOTHERS AND FATHERS, GIRLS AND BOYS:

ATTACHMENT BEHAVIOR IN THE FIRST TWO YEARS OF LIFE

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Marsha Weinraub and Peggy Ban

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Attachment Behavior in the First Two Years of Life

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Abstract

Twenty children, 10 boys and 10 girls, were seen at one and two years of age in a free play situation. At each age each infant first played with one parent and then a week later with the other. Attachment behavior (proximal and distal modes) was observed and found to be affected by the sex of infant and sex of parent. Moreover, Bayley Mental Maturity Index obtained at two years was found to be correlated with certain patterns of attachment behavior over the first two years of life. These findings are discussed in terms of attachment theory and the etiology of sex differences in interpersonal relations.

Mothers and Fathers, Girls and Boys: Attachment Behavior in the First Two Years of Life[1]

Michael Lewis, Marsha Weinraub, and Peggy Ban

Educational Testing Service

In the investigation of early social and cognitive development, the issue of attachment--or the nature of the caretaker-infant bond--has become increasingly important. Despite the considerable research that has been conducted in this area, there are three specific issues that require further clarification. They are (1) the behaviors the child uses to express attachment at different ages and how these behaviors are interrelated both within and across ages, (2) sex of child-sex of parent differences in the use of attachment behaviors, and (3) the relationship between attachment and cognition. The developmental course of attachment has been discussed, but theoretical as well as empirical clarification is needed. Does the attachment bond between parent and child vary in strength as the child matures, or is it that the behaviors used to express attachment at different ages change?

The first problem to be considered in this paper is the nature of the specific behaviors which are indicative of attachment and how these behaviors are interrelated. In an early exploratory study, Schaffer and Emerson (1964) measured attachment by the child's protest and distress behavior in a separation situation. Since Schaffer and Emerson's study, a wide variety of behaviors have been used to assess attachment in free play, separation, and exploratory situations. These behaviors include the child's activity level, how far he travels from the mother, the number of times he leaves the mother, and the amounts of time he spends smiling, crying, looking, vocalizing, and touching

the mother. The relationships among these behaviors, both within and across situations, have been explored (Ainsworth & Bell, 1970; Ainsworth & Wittig, 1969; Coates, Anderson & Hartup, 1972; Fleener, 1967; Goldberg & Lewis, 1969; Lewis & Ban, 1971; Maccoby & Feldman, 1972; Rheingold & Eckerman, 1969). Perhaps the most fruitful line of research has been investigating whether there are specific clusters of infant behaviors used in attachment relations. There appears to be a continuum of behaviors, depending on the immediacy of direct contact, that can be used to maintain communication with others. Touching and staying near another, by definition, require close bodily contact, and these are termed proximal behaviors. Looking and vocalization are modes of communication at a distance and are thus termed distal behaviors. In a free play, low-stress situation, Lewis and Ban (1971) studied the relationship of four behaviors--touching, proximity, looking, and vocalization. One- and two-year-old children who touched their mothers a lot also tended to stay near their mothers, and children who looked at their mothers a lot also talked to their mothers a lot. However, children who touched their mothers a lot did not necessarily look at their mothers a lot. Hence, it was postulated that there are two primary modes which children use to maintain contact with their mothers--a proximal mode, which includes touching and proximity, and a distal mode, which includes looking and vocalization. While behaviors within each mode are correlated, behaviors across modes (e.g., touch and look) are not.

The developmental course of attachment poses a difficult problem in the attachment literature, and a variety of models exist to explain the changes in attachment over age. If one specifies certain behaviors which are characteristic of attachment and these behaviors decline with age, then, one could argue, attachment also decreases with age. However, if one holds that it is the behavior in the service of the attachment motive rather than attachment

itself which changes, then the use of multiple responses to measure attachment becomes crucial (Lewis & Ban, 1971). It is obvious that different behaviors can be used to express the same needs and emotions at different ages. An infant who is hungry cries to signal his hunger. However, with maturity, crying decreases. Does this mean hunger, too, is decreasing? No, the child merely begins using other, more socially acceptable means of expressing his hunger. Like hunger, attachment needs may persist throughout life, but the behaviors used to express attachment may change. As the child matures he develops greater competence in communication and mobility, and his desire for exploration increases. These changes and changes in the social demands from the environment may cause the child to relinquish proximal modes of behavior and to rely instead on more distal forms of behavior to maintain attachment relations. In a longitudinal study over the first two years of life, Lewis and Ban (1971) noted a lack of stability of attachment behaviors from one year to the next. Proximal behaviors tended to be negatively correlated from one year to the next while distal behaviors were positively correlated. Moreover, children who touched a lot at age one tended to look a lot at age two, indicating that proximal attachment behavior at age one is transformed into distal behavior at age two. Proximal behavior may be a valid index of attachment for one-year-old children, but a sign of insecure attachment for two-year-olds. This transformational view of attachment behavior seems necessary for the consideration of attachment as a stable construct varying in mode of expression at different ages. Though the absolute intensity of attachment may also change with age, there may be stable developmental patterns to attachment such that individual children who are highly attached relative to other children the same age are also relatively more attached to their parents at a later stage of development. It is this stability we wish to investigate.

A second important question concerns the nature of individual differences in the expression of attachment. It may be naive to expect that the transformation of attachment behavior (i.e., from proximal to distal) over age follows the same patterns for all children. There may be important individual differences in the patterns of behaviors depending, for example, on the sex of the child. Though males and females may form attachments of equal intensity, early sex differences in response to stimulation (Bardwick, 1971; Kagan & Lewis, 1965; Lewis, 1969; Moss & Robson, 1968), differential mothering patterns (Goldberg & Lewis, 1969; Lewis, 1972a,b; Moss, 1967), and divergent personality types in later childhood all suggest that the sexes may demonstrate attachment in different ways. In the first few months of life boys receive more proximal stimulation, such as rocking and handling, and girls receive more distal stimulation, such as talking and looking from their mothers. However, by six months of age proximal stimulation toward boys has decreased. In our culture adult communication between persons is limited to the distal modes of expression, and proximal modes of expression are discouraged. In addition, there is even less tolerance for proximal expression for males than there is for females. Such behaviors expressed by males not only are viewed as incompatible with masculine independence, they are also seen as connoting sexual interest, if expressed toward a female, or homosexual tendencies in the individual, if expressed toward another male. While all children are socialized to move from proximal to distal modes of relating to others, this socialization may occur earlier and more vigorously for male children than for female children. Thus, girls would be more likely to persist in their use of proximal behaviors than boys, while boys would be pushed to rely more on the use of distal behaviors in their relationships with the parent (see Lewis, 1972b).

Though sex differences of children in the expression of attachment have been studied, the issue of sex differences in the object of attachment has not. The mother is usually assumed to be the child's first object of attachment, but she is by no means the only one. Certainly the father plays a significant role in the socialization of the child; nevertheless, his role in the attachment process has been largely ignored in the literature.

It seems apparent that attachment exerts considerable influence on intellectual development. A child who has a secure attachment to his parent can safely and confidently explore his environment. Rubenstein (1967) has demonstrated that children with more attentive mothers are more likely to explore their environment and pursue novel features of the environment. However, the interaction between intellectual and socioemotional development is not unidirectional; intellectual development can also influence socioemotional development--more specifically, the nature of the parent-infant attachment bond. A curious child, who actively explores the environment and who tends to score high on intelligence scales, may need to use different behaviors (i.e., more distal) to maintain contact with an attachment figure. In addition, an intelligent child may be more aware of and responsive to social demands changing with age. Thus, if there are indeed external as well as internal pressures for transformation of attachment behavior from proximal to distal forms of expression, then intelligent children should show greater decreases than other children in proximal behaviors and greater increases in distal behaviors.

In this longitudinal study, we examined the interrelationship between the sex of the child and the sex of the parent on the expression of attachment behaviors in the first two years of life. Special consideration has been paid to developmental changes in the attachment structure and the relationship of attachment to cognitive development.

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Procedure

Ten male and 10 female Caucasian, middle class one-year-old infants (± 2 weeks) made two visits, a week apart, to the laboratory. On one visit the mother accompanied the child, and on the other, the father. The sample was split such that for half the subjects, the mother accompanied the child on the first visit, and for the other half, the father accompanied the child on the first visit. When the children were two years old (± 8 weeks, except for one male who was two years, three months) all of the males and eight of the females returned to the laboratory. The children who came with their mother or father on the first visit at age one came with the same parent on the first visit at age two. (Two exceptions were made for parental convenience.)

The play situations at one and two years of age were identical. The carpeted, normally-lighted playroom was approximately 12 feet by 12 feet. It was divided into a series of 12 areas by thin lines on the floor so that the infant's positioning could be observed and recorded. A chair in one corner of the room was provided for the parent. Toys were placed in each of the squares except the three in the immediate vicinity of the parent.

Each subject, accompanied by its parent, entered the room. The parent sat on the chair and held the child in his or her lap. On signal (a tap on the observation window) the child was placed on the floor by the parent and was free to move about the room at will. The parent was instructed to watch the child's play and respond as naturally as possible. However, the parent was told not to <u>initiate</u> any interaction. Fifteen minutes of play were observed from behind a one-way mirror. Different observers at each year recorded on an event recorder four of the child's attachment behaviors: amount of time touching the parent, looking at the parent, vocalizing to the parent, and the amount of time the child was in the proximity of the parent. Proximity was scored when the child was within any of the four squares surrounding the parent's chair.

At two years of age several tests were administered to each child following the 15 minutes in the playroom with the mother: the Bayley Scales of Infant Development (Bayley, 1969), the Peabody Picture Vocabulary Test (PPVT, Dunn, 1965), and our modified version of the PPVT. In this modified version the child had to name the first 12 pictures from the standard PPVT which were presented individually on separate cards.

Results

Each child was given a score for the cumulative number of seconds he spent touching, in the proximity of, looking at, and vocalizing to each parent at each age. Log (x + 1) transformations of the four attachment behavior scores were used in the statistical computations to normalize the scores and stabilize the variance, since the variability for the boys' scores was greater than that for the girls. Nonparametric tests also were performed and in most cases paralleled the parametric results.

Mean Data

Insert Table 1 about here

Table 1 presents the mean amounts of time one-year-old boys and girls touched, stayed in the proximity of, looked at, and vocalized to each parent. In the mean data there were no infant sex differences in the amount of expression of any of the four behaviors; instead, parent differences predominated. There was almost twice as much proximal behavior directed toward the mothers as toward the fathers ($F = 8.53$, $df = 1/16$, $p < .01$ for touching; $F = 24.34$, $df = 1/16$, $p < .001$ for proximity). In the distal mode, the differences between attachment scores as a function of sex of parent were less conspicuous. There was slightly more vocalizing directed toward the mothers ($F = 5.57$, $df = 1/16$, $p < .05$) for

both boys and girls, but for looking there was an interesting sex of child-sex of parent interaction. While girls looked equally at both parents, boys looked at their fathers significantly more than they looked at their mothers ($F = 9.93$, $df = 1/16$, $p < .01$). Thus, for girls, both proximal (touch) and distal (look) behaviors favor their mothers over their fathers. For boys this is more complex--proximal behavior favors their mothers while looking, a distal behavior, favors their fathers.

Insert Table 2 about here

Table 2 presents the mean amounts of time boys and girls touched, stayed in the proximity of, looked at, and vocalized to each parent when the children were two years of age. While the means for each sex appear to be quite different in some cases, there were no significant sex of child differences in the mean amounts of behaviors expressed toward the parents. Nonparametric analyses also failed to show significant differences (Fisher Exact Probability Tests). It can be noted that, in general, scores for the boys were more variable than the scores for the girls. For example, girls spent between 2 and 9% of their time touching both parents; boys spent between 1 and 49% of their time touching both parents. Six boys touched their parents more than 9% (the limit for the girls) of the time, and three boys spent more than 25% of the time touching the parents. Of these three boys, the two highest touchers had been traveling more than an hour in the car immediately prior to each of the testing sessions. Another subject, a girl who had also traveled a long distance, touched her parents only about 5% of the total time.

By age two those mean differences that were found at age one in the expression of attachment behaviors as a function of sex of the parent are no longer apparent.

Indeed, there was a tendency for two-year-old children to spend more time in the proximity of their fathers than their mothers ($F = 3.55$, $df = 1/14$, $p < .08$).

Insert Figure 1 about here

Figure 1 shows the change from age one to age two in attachment behaviors expressed toward each parent. The total amount of proximal behavior--touching and proximity--decreased from age one to age two although these differences were not significant ($F = 2.49$, $df = 1/17$, $p < .13$; $F = 2.07$, $df = 1/17$, $p < .17$, respectively). While touching behavior did not show a significant interaction between age and parent, separate analyses indicated that touching the mother tended to decrease (from a mean of 354.0 seconds spent touching the mother at one year to 199.3 seconds at two years of age, $F = 3.30$, $df = 1/17$, $p < .09$), while touching the father tended to increase from age one to age two (from a mean of 164.0 seconds spent touching to 183.8 seconds, $F = 2.62$, $df = 1/17$, $p < .12$). There was a significant parent x age interaction for the proximity scores ($F = 18.16$, $df = 1/17$, $p < .0005$). Proximity to the father increased from age one to age two (from a mean of 928.3 seconds to 1162.2 seconds, $F = 5.50$, $df = 1/17$, $p < .03$), while proximity to the mother decreased, although not significantly (from a mean of 1193.2 seconds to 985.5 seconds, $F = 1.30$, $df = 1/17$, $p < .27$). While both distal behaviors expressed toward both parents increased significantly over age ($F = 10.55$, $df = 1/17$, $p < .005$ for vocalizing), vocalizing increased more to the fathers than to the mothers ($F = 6.13$, $df = 1/17$, $p < .02$).

Insert Figure 2 about here

Observation of touching and looking behaviors toward each parent (see Figure 2) over the two ages shows a fairly clear picture. Proximal attachment behaviors expressed toward mothers decreased over age, while distal

behaviors expressed toward mothers increased. This is consistent with the data of Lewis and Ban (1971). On the other hand, both proximal and distal behaviors expressed toward fathers increased over age. Although touching the father increased from age one to two the levels at age two were about the same for both parents.

Interrelationships among Behaviors

In order to determine the interrelationships among the four attachment behaviors, Pearson Product Moment Correlation matrices were prepared on the log (x + 1) transformations of the data. Kendall Rank Correlation Coefficients (Siegel, 1956) were also computed for some of the data to be sure that the use of the normal statistic with log transformations of the data was appropriate. In all cases, parametric and nonparametric correlations were in the same direction and significance levels obtained were highly similar.

Insert Table 3 about here

One-year-olds. Table 3a shows the correlations for the four attachment behaviors directed by one-year-olds to their mothers. At one year boys showed a high degree of integration of attachment behavior. Although some were weak, all the correlations among the behaviors were positive. Touching in particular had a strong positive correlation with the other three behaviors. A boy who touched his mother a lot also stayed near, looked at, and vocalized to her a lot. On the other hand, girls' behavior with their mothers was differentiated into proximal and distal modes. Touching and proximity behaviors correlated positively and looking and vocalizing behaviors correlated positively. Correlations between behaviors across modes (i.e., touching and looking) were negative.

Table 3b presents the correlations between behaviors directed by one-year-olds to their fathers. Here, too, the boys showed a highly integrated pattern

of behaviors; all behaviors correlated positively. Girls, however, showed neither an integrated pattern of behavior as the boys showed toward both parents, nor "dual mode" behavior, as the girls showed toward their mothers.

Insert Table 4 about here

Two-year-olds. Table 4a presents the correlations among the four behaviors directed toward mothers by the two-year-olds. At two years of age boys showed a tendency toward a differentiated pattern of behavior toward their mothers. The behaviors within the proximal and distal modes, respectively, were positively correlated. While vocalization was positively correlated with the other three behaviors, and, indeed, significantly correlated with proximity, looking, a distal behavior, showed no correlation with touch ($r = -.17$) or proximity ($r = .01$). In contrast, girls showed an integrated pattern of behavior toward their mothers. All the correlations among the girls' behaviors were positive.

Table 4b presents the correlations between the four behaviors directed by two-year-olds to their fathers. Boys showed highly differentiated modes of attachment behaviors. Behaviors within modes had high positive correlations, while behaviors across modes (i.e., touch and look) had strong negative correlations. The correlations for girls' behaviors indicated that there was a tendency for behaviors across modes to be negatively correlated (for example, the correlation between touch and look was -.29, the correlation between look and proximity was -.73); however the behaviors within modes showed no strong positive relationship (the correlation between touch and proximity was .08, the correlation between vocalize and look was .18).

The within-age correlations among behaviors can be summarized by age, sex, and parent effects. At one year of age boys showed integrated behavior patterns

to both parents while girls showed more differentiated patterns. In addition, girls' differentiation of behaviors across modes showed more clearly in the presence of the mothers than the fathers. At two years of age the situation reversed. Boys' behavior became more differentiated than girls', and for both sexes, the differentiation was stronger in the presence of the fathers than the mothers. Two-year-old girls showed highly integrated patterns of behavior with their mothers.

Across-Age Correlations

Insert Table 5 about here

Table 5 presents the correlations between the four attachment behaviors for boys and girls expressed in the presence of each parent at one year of age and those same behaviors expressed by boys and girls at two years of age.

In our use of the transformational analysis model we hypothesized that children would decrease their expression of proximal behavior (touching and proximity) but increase their expression of distal behavior (looking and vocalizing). The mean data showed some support for our predictions; namely that there is a change from proximal to distal forms of behavior in the service of the attachment motive and not necessarily a change in the strength of the attachment bond itself. Of the four attachment behaviors measured in this study, touching and looking were probably the best measures of the attachment motive. Proximity behaviors may be affected by the position of the parents' chair near the exit of the room and the placement of the toys; vocalization may be affected by the child's developing language abilities independent of attachment. Hence we will focus on touching and looking scores to find support for the transformational model.

Insert Table 6 about here

Table 6 summarizes the data from Table 5 which most directly bear upon this issue. If there is a transformation from proximal (i.e., touching) to distal (i.e., looking) modes of behavior in the expression of attachment, then this transformation should be indicated not only by the mean data but also by individual data in the form of correlations. Touching at age one should be unrelated to touching at age two, but positively related to looking at age two. Indeed, for boys with their mothers, boys with their fathers, and for girls with their fathers, touching behavior at age one was negatively, though insignificantly, correlated with touching behavior at age two ($r = -.29$, $-.26$, and $-.45$, respectively), but positively correlated with looking behavior at age two ($r = .69$, $.48$, and $.31$, respectively). Moreover, in order to show that the transformation is unidirectional we would expect looking at age one not to be related, or perhaps to be even negatively related, to touching at age two. In fact, the correlations were in a negative direction. For the boys for both parents and girls for fathers, the correlation between touching at age two and looking at age one was $-.45$, $-.38$, $-.35$, respectively. Thus, those groups of children who were high touchers at age one tended to become relatively low touchers but high lookers at age two. Our interpretation is that children who touched a lot at age one were sufficiently attached to their parents to venture out securely into the environment when mobility increased. To maintain contact with the parent, distal forms of behavior became increasingly necessary. The tendency toward a negative correlation for touching from age one to age two may indicate that those children who continued to touch their parents a lot at age two were those children for whom the attachment bond was weaker at age one and perhaps not strong enough to provide the security necessary to explore the environment actively, and so they stayed close or even clung to their parents. Though frequent touching may be indicative of attachment to the parent at one year of

age, at age two frequent touching may be indicative of an insecure attachment and an inability to explore the environment in safety. Indeed, one two-year-old male child in our sample clung to each of his parents nearly the entire time he was in the playroom with them. His intelligence scores were low. He was one of four children in the family and apparently had difficulty functioning independently. Another male child, who appeared very self-sufficient and had high intelligence scores, had very low touching scores in the presence of his parents but very high looking scores. That children who look a lot at age one continued to look a lot relative to other children at age two (for boys with their mothers $r = .69$, for boys with their fathers $r = .49$, for girls with their fathers $r = .24$), despite the overall increase in looking scores for all children, suggests that looking is a developmentally higher level of expression of attachment, and, as such, it is relatively stable over age.

While similar results were found for boys toward both parents and girls toward their fathers, the pattern of girls' behavior toward their mothers was somewhat different. While touch at one year was positively correlated with look at two, touch at one year was more predictive of touch at two. Thus, the transformation of behaviors which took place for girls toward their fathers was not observed with girls toward their mothers. We strongly suspect that this lack of transformation has to do with the special attachment relationship that exists in this culture between a girl and her mother.

Further support for the transformation hypothesis can be found by scanning Table 5a and b. For boys with both parents, eight out of eight correlations between touching at age two with all of the attachment behaviors at age one were negative, and seven out of eight of the correlations between proximity seeking at age two with the attachment behaviors at age one were negative. As mentioned previously, girls with their mothers did not provide support for the transformational analysis.

Touching at age two correlated positively with the four attachment behaviors at age one, and though proximity behaviors at age two correlated negatively with distal attachment behaviors at age one, they were positively correlated with proximal attachment behaviors at age one. On the other hand, for girls with their fathers, three out of four correlations between touching at age two and the attachment behaviors at age one were negative, and three out of four correlations between proximity and the attachment behaviors at age one were negative. (All of the exceptions noted are correlations with vocalization scores. Their relationship to the attachment motive at each age was questioned earlier in this paper.) However, 15 of the 16 correlations (for each sex with each parent) between looking at age two and the attachment behaviors at age one were positive as predicted.

Intelligence Data

Insert Table 7 about here

Mean sex differences. Table 7 presents the intelligence scores for each sex at age two. Though both groups scored above average, there were no sex differences in any of the intelligence measures.

Insert Table 8 about here

Intercorrelations between intelligence measures. The three scores on the intelligence tests do not intercorrelate as highly for girls as they do for boys (see Table 8). The correlation for boys may have been inflated by the greater range of scores for boys. Since the Bayley test may be a more sensitive and better standardized measure of this age group, and since there were no sex differences in means or variances, further correlations in this report concerning intelligence will use the Bayley raw scores.

Insert Table 9 about here

Correlations of intelligence scores with attachment behaviors directed toward each parent. Table 9 presents the correlations between the Bayley intelligence scores and the four attachment behaviors directed toward each parent at age two. For mother-directed behaviors the correlations for girls were all positive. Thus much distal and proximal attachment behavior was positively correlated with performance on the Bayley task. For boys, however, only the distal behavior, specifically looking, was positively correlated with the intelligence test. For father-directed behaviors the proximal-distal distinction became even clearer. For boys it was still only the distal behaviors which were positively correlated with the intelligence task. For the girls it was the distal, as opposed to the proximal, behaviors which were more positively correlated with the intelligence task. It would appear that the more intelligent a boy was, the more likely he was to express his attachment toward his parents by distal behaviors and the less likely by proximal behaviors. Moreover, he responded to both parents in a similar fashion. In contrast, girls' behavior varied as a function of the sex of her parent.

Like boys, more intelligent girls were more likely to express distal rather than proximal behaviors toward their fathers. However, as we have seen, girls' relationships with their mothers present the one deviation in the child-parent attachment relationships. Once again the attachment behaviors appear to be related so that the more intelligent girls express more of both distal and proximal behaviors toward their mothers. This girl-mother relationship, in contrast to the other three relationships, appears to us to have special meaning which we shall return to shortly.

Correlations between intelligence scores and attachment change scores from first to second year. The correlations between intelligence scores and the amount and direction of change from age one to age two in the expression of each attachment

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Insert Table 10 about here
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behavior are presented in Table 10. Although only one correlation was significant, all but one of the correlations were in the direction predicted by the transformational analysis model. More intelligent children tended to decrease to a greater extent their expression of proximal attachment behaviors as they matured than less intelligent children. Although almost every child increased the amount of looking and vocalization to their parents at two years of age, more intelligent children tended to increase the expression of these behaviors more than less intelligent children.

Discussion

The results of this study are complex, and it is difficult to make general statements. The developmental pattern of attachment seems to be affected by the sex of both the parent and the child. Nevertheless, some broad statements concerning the overall pattern of the data will be made first, followed by the qualifications depending on the sex of child-sex of parent. Evidence has been provided for the notion that there are two modes of behavior children use to express attachment: a proximal mode which includes touching and proximity (staying near) and a distal mode which includes looking and vocalizing. While behaviors within each mode are often correlated, behaviors across modes are not. It seems likely that modes of behavior become increasingly differentiated with age (Coates, et al., 1972; Lewis & Ban, 1971).

More important, the results provide strong support for the transformational analysis of attachment behavior suggested by Lewis and Ban (1971). As they grow older, children change the behaviors they use to maintain contact with the parent. The mean data indicate that touching, a proximal behavior, tends to decrease from one to two years of age, while looking, a distal behavior, increases with age. Lewis and Ban (1971) and Rheingold and Eckerman (1969) have found similar results within the first two years of life; Maccoby and Feldman (1972) found further decreases in proximity behavior and increases in distal behaviors (smiling, showing toys, and vocalizing) in the third year of life.

Here is a good example of how the choice of measures determines the conclusions that can be drawn. If one were to assess the development of attachment based on changes in either of these two modes of attachment behavior separately, then, clearly, one would be forced to contradictory conclusions. According to the changes in the proximal mode, attachment would appear to be decreasing, while according to changes in the distal mode, attachment would appear to be on the rise. However, by postulating a transformation in the expression of attachment from proximal to distal behaviors, a stable construct emerges. The correlational data indicate that, in general, touching at one year of age is not correlated with touching at two years of age but is positively correlated with looking at two years. That is, those children who are frequent touchers at one year of age are no longer frequent touchers but are frequent lookers at two years of age. Those children who are frequent lookers at one year continue to be frequent lookers in the second year. By considering multiple measures of attachment and their interrelationships we can see that it is not necessarily attachment per se that varies over age, but the behaviors used to express attachment. Proximal behavior is transformed into distal behavior, while distal behavior remains in the service of the attachment motive. We might suggest that distal

behaviors such as looking eventually undergo more of a transformation. This time looking behavior gives way to thinking about the parents. Thus, "what would my mother think of what I'm doing" may be the final transformation of attachment expression which started with the infant-mother in a frontal-frontal full body contact.

Two factors may be responsible for the transformation from proximal to distal expressions of attachment. With maturity and increasing mobility, attachment and exploratory behaviors may begin to compete for expression. Proximal attachment behaviors--touching and proximity--are incompatible with exploratory and play behaviors, whereas distal behaviors are not. Thus, as the child matures, he begins to rely increasingly on distal behaviors to maintain attachment to the parent. In addition, the transformation from proximal to distal forms of behavior is consistent with changing social demands on the child. In our culture parents wish to make their children as "independent" of them as possible and as such parents become impatient with and embarrassed by the child's clinging behavior. They then differentially reward different types of attachment behavior, pushing their children from them and encouraging distal forms of contact (see Lewis, 1972b, for a description of just such an interaction).

The relationship between intelligence and the shift in attachment behavior is interesting. Brighter children showed greater decreases in proximal attachment behaviors and greater increases in distal attachment behaviors. This finding could arise from the fact that more intelligent children are more attuned to changing social demands. Just as likely, the roots of the relationship are embedded somewhere in the complex relationship between intelligence, security of attachment, and exploratory drives. However, this finding is of a correlational nature only, and it could easily be that the parents' educational or intellectual level influences the demands they place on the child and their socialization techniques.

The issue of sex differences in attachment is an important one. In a study of 13-month-old children from a wide variety of backgrounds, Goldberg and Lewis (1969) found that girls returned to touch their mothers more quickly than boys, stayed closer to the mother, and tended to look at and talk to their mothers more often than boys. Messer and Lewis (1972), studying lower class children, found similar sex differences in proximity behaviors. However, many other studies have not found sex of child differences in the mean amount of attachment behaviors to the parent in the first (Ainsworth & Bell, 1970; Coates, et al., 1972; Rheingold & Eckerman, 1969) and second years of life (Coates, et al., 1972; Maccoby & Feldman, 1972). Indeed, variability within sex is often quite large. It is possible that socioeconomic class and educational background are significant determinants of sex differences. Of the two groups of investigators which have uncovered sex differences, Messer and Lewis (1972) studied lower class families, while Goldberg and Lewis (1969) studied families of heterogeneous backgrounds. Almost all of the studies which have not found mean sex differences, including the present study, have included primarily middle to upper middle class, college educated families in a university community.

The sex difference that does emerge from this study and supports trends from the Lewis and Ban (1971) study concerns the clustering of behaviors at each age and transformations of behavior from age one to age two. There are also important sex of child-sex of parent interactions in attachment behavior. For boys, attachment behavior toward each of the parents shows similar patterns. Though all four attachment behaviors at one year of age for boys are highly integrated, by two years of age behaviors differentiate into two modes. Proximal behavior at one year of age is transformed into distal behavior at two years of age. Furthermore, at age two proximal attachment behaviors are negatively correlated with intelligence, while distal behaviors, primarily looking,

are positively correlated with intelligence. Thus, at age one proximal behavior is an expression of attachment undifferentiated from distal behavior, but by age two, proximal behavior is transformed into distal behavior, and distal behavior is increasingly relied on to express attachment toward both parents. This, we suggest, is a result of the fact that males in our society are discouraged from using proximal forms of behavior because these behaviors are incompatible with our emphasis on male independence and have come to have possible sexual or homosexual overtones.

Girls, however, show a very different developmental sequence of attachment behavior. At one year of age, girls' attachment behaviors seem to be differentiated into proximal and distal modes. However, by two years of age this differentiation only exists in the presence of fathers. Two-year-old girls show a highly integrated pattern of attachment behavior with their mothers and all of these attachment behaviors are positively correlated with intelligence. In addition, while girls show a transformation from proximal to distal expression of attachment behavior with their fathers, they do not show the same transformation of behaviors expressed toward their mothers. We believe that the reason girls do not change their mode of attachment with their mothers, while boys do, is that females, unlike males in our society, are relatively free to express proximal behaviors toward other females. It is only with males, beginning early in life with their fathers, that girls must inhibit the expression of proximal behavior for fear of possible societal censure. This female-female proximal relationship is maintained throughout life, from two girls dancing together on a teenage rock show, to women kissing one another, to old women holding onto each other. Men in our society must give up these proximal relationships. Thus, the transformation takes place in all conditions except female-female and is first seen in the mother-daughter relationship.

The general transformational model of attachment behavior must be modified to take into account the individual child's changing relationship with each of his parents. Proximal behaviors toward the mother tend to decrease, while distal behaviors increase. Interspersing these facts within a transformational model leads one to conclude that while the behaviors used to express attachment may vary, the strength of the bond to the mother remains relatively constant. However, the child's relationship to the father is not as clear-cut. While proximal attachment to the mother seems to be decreasing, proximal attachment behavior to the father either increases or stays the same. In addition, distal behaviors to the father are increasing to a larger extent than these same behaviors are increasing to the mother. Nevertheless, by the second year there are no differences in the amount of behaviors directed toward mothers or fathers. We consider these findings evidence for the fact that the attachment bond to the father in the first year of life is weaker than the attachment bond to the mother. Though attachment in general is undergoing changes in the mode of expression, the attachment behavior to the father is increasing such that by age two the child is equally attached to both parents.

The child's weaker attachment bond to the father than to the mother in the first year of life is understandable in light of the fact that the father's contact with the child is so much less frequent and of a different nature than the mother's. The fathers in our study estimated that they spent approximately 15-20 minutes of play a day with their children. Though no estimate of time spent with the child was obtained from the mothers in our study, all of the mothers in the study assumed major caretaking responsibility for the children. The length of time of play reflects what processes may be at work. In the first year of life most parent-child relationships center around the caregiving functions. These functions--feeding, changing, etc.--have been associated with

female activities (as well as being proximal in nature) and as such fathers are reluctant to participate. However, as the child becomes older, certainly by the second year, more of the parent-child relationship centers around other than caregiving activities--for example, play. Fathers are then less reluctant to participate and their interaction with their children increases. The expression of distal behaviors toward the father, especially looking, appears to be less affected by the reduced contact of fathers as compared with mothers in the first year. The fact that fathers may be more novel may contribute to looking but not approaching behaviors. By the second year, attachment behaviors, at least those proximal ones that were initially weak, become stronger and approach the level found for the mother.

The sex of child-sex of parent differences in attachment behavior that we have found would appear to be culturally specific and seem to herald the kind of interpersonal behaviors that we observe in adults. There is no reason to suspect that these are universal interpersonal characteristics or for that matter would hold for different ethnic groups. Rather they seem to reflect the socialization processes wherein the young are initiated into the particular value of the subculture.

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Footnote

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Table 1

Mean Scores (in seconds) for Each of the Four Attachment Behaviors by One-Year-Olds to Their Mothers and Fathers

(a)

Mother-Directed Behaviors

	Boys (N = 10)		Girls (N = 10)	
	$\bar{X}$	S.D.	$\bar{X}$	S.D.
Touch	213.2	146.8	145.8	118.7
Proximity	595.6	191.3	597.6	205.9
Look	57.9	23.9	62.6	30.4
Vocalize	84.2	38.9	75.2	35.0

(b)

Father-Directed Behaviors

	Boys (N = 10)		Girls (N = 10)	
	$\bar{X}$	S.D.	$\bar{X}$	S.D.
Touch	105.4	118.8	58.6	65.4
Proximity	455.4	205.8	472.9	237.7
Look	94.6	40.8	53.7	34.5
Vocalize	62.8	56.4	48.6	35.5

Table 2

Mean Scores (in seconds) for Each of the Four Attachment Behaviors by Two-Year-Olds to Their Mothers and Fathers

(a)

Mother-Directed Behaviors

	Boys (N = 10)		Girls (N = 8)	
	$\bar{X}$	S.D.	$\bar{X}$	S.D.
Touch	151.8	145.2	47.5	25.2
Proximity	488.2	163.7	497.3	139.3
Look	112.7	42.0	113.8	40.3
Vocalize	162.0	79.6	111.3	57.2

(b)

Father-Directed Behaviors

	Boys (N = 10)		Girls (N = 8)	
	$\bar{X}$	S.D.	$\bar{X}$	S.D.
Touch	135.9	156.0	47.9	17.9
Proximity	594.2	167.1	568.0	145.3
Look	119.2	79.2	94.5	49.6
Vocalize	152.9	112.7	84.1	25.6

Table 3

Pearson Product Moment Correlation Matrices for the Four Attachment Behaviors by One-Year-Olds to Their Mothers and Fathers

(a)

Mother-Directed Behaviors

		Touch	Proximity	Look	Vocalize
Touch	Boys (N=10)		.78**	.50	.64*
	Girls (N=10)		.28	-.16	-.12
Prox.	Boys			.65*	.21
	Girls			-.35	-.75*
Look	Boys				.23
	Girls				.25
Voc.					

(b)

Father-Directed Behaviors

		Touch	Proximity	Look	Vocalize
Touch	Boys (N=10)		.66*	.63*	.64*
	Girls (N=10)		.10	.69*	-.32
Prox.	Boys			.85**	.81**
	Girls			-.29	-.17
Look	Boys				.80**
	Girls				-.29
Voc.					

* = $p < .05$ (two-tailed)
** = $p < .01$

Table 4

Pearson Product Moment Correlation Matrices for the Four Attachment Behaviors by Two-Year-Olds to Their Mothers and Fathers

(a)

Mother-Directed Behaviors

		Touch	Proximity	Look	Vocalize
Touch	Boys (N=10)		.49	-.17	.28
	Girls (N=8)		.49	.87**	.49
Prox.	Boys			.01	.85**
	Girls			.42	.40
Look	Boys				.23
	Girls				.49
Voc.					

(b)

Father-Directed Behaviors

		Touch	Proximity	Look	Vocalize
Touch	Boys (N=10)		.72*	-.47	-.58^{+}
	Girls (N=8)		.08	-.29	-.33
Prox.	Boys			-.70*	-.71*
	Girls			-.73*	-.07
Look	Boys				.88**
	Girls				.18
Voc.					

$^{+}p < .10$ (two-tailed)
$*p < .05$
$**p < .01$

Table 5

Across-Age Correlation Matrices for the Four Attachment Behaviors

(a)

Mother-Directed Behaviors

		Age 2			
		Touch	Proximity	Look	Vocalize
Age 1 Touch	Boys (N=10)	-.29	-.22	.69*	-.04
	Girls (N=8)	.51	.81*	.28	.50
Age 1 Prox.	Boys	-.32	-.19	.68*	-.09
	Girls	.37	.65+	.14	-.19
Age 1 Look	Boys	-.45	-.23	.69*	.09
	Girls	.15	-.34	.16	-.54
Age 1 Voc.	Boys	-.50	.02	.58+	.35
	Girls	.27	-.28	.59	.25

(b)

Father-Directed Behaviors

		Age 2			
		Touch	Proximity	Look	Vocalize
Age 1 Touch	Boys (N=10)	-.26	-.29	.48	.22
	Girls (N=8)	-.45	-.01	.31	.35
Age 1 Prox.	Boys	-.59+	-.32	.44	.42
	Girls	-.02	-.24	.09	.65*
Age 1 Look	Boys	-.38	-.15	.49	.26
	Girls	-.35	-.09	.24	-.10
Age 1 Voc.	Boys	-.41	-.28	.19	.17
	Girls	.22	.13	-.02	-.59

+$p < .10$ (two-tailed)
*$p < .05$

Table 6

Transformations of Touching to Looking
from Age 1 to Age 2

(a)

Mother-Directed Behaviors

Age 1		Age 2	Boys N = 10	Girls N = 8	Total N = 18
Touch	→	Touch	-.29	.51	-.09
Touch	→	Look	.69*	.28	.54*
Look	→	Touch	-.45	.15	-.35
Look	→	Look	.69*	.16	.50*

(b)

Father-Directed Behaviors

Age 1		Age 2	Boys N = 10	Girls N = 8	Total N = 18
Touch	→	Touch	-.26	-.45	-.26
Touch	→	Look	.48	.31	.42+
Look	→	Touch	-.38	-.35	-.17
Look	→	Look	.49	.24	.38

+$p < .10$ (two-tailed)
*$p < .05$

Table 7

Intelligence Scores at Age 2

	Bayley (Raw)			Bayley (I.Q.)			PPVT (Standard)			PPVT (Modified)		
	$\bar{X}$	S.D.	N	$\bar{X}$	S.D.	N	$\bar{X}$	S.D.	N	$\bar{X}$	S.D.	N
Boys	151.6	6.7	10	113.9	15.3	10	130.0[a]	39.0	6	108.6[b]	42.2	7
Girls	154.2	4.6	8	121.2	12.9	8	123.1	17.9	8	129.4	22.7	8

[a]Four boys could not be tested. Their scores were deleted in the calculations.

[b]Three boys could not be tested. Their scores were deleted in the calculations.

Table 8

Intercorrelations between Intelligence Measures

		PPVT (Standard)	N	PPVT (Production)	N
Bayley (Raw)	Boys	.93**	6	.79*	7
	Girls	.69^{+}	8	.81*	8
PPVT (Comprehension)	Boys			.88*	6
	Girls			.41	8

$^{+}p < .10$ (two-tailed)

$*p < .05$

$**p < .01$

Table 9

Correlations between Bayley Raw Scores and Attachment Behaviors at Age 2

(a)

Mother-Directed Behaviors

		Touch	Proximity	Look	Vocalize	N
Bayley Raw Scores	Boys	-.19	-.36	.62+	-.32	10
	Girls	.81*	.65+	.66+	.69+	8
	Total	-.09	-.12	.61**	-.15	18

(b)

Father-Directed Behaviors

		Touch	Proximity	Look	Vocalize	N
Bayley Raw Scores	Boys	-.19	-.24	.52	.45	10
	Girls	.05	.18	.22	.52	8
	Total	-.21	-.14	.40+	.37	18

+ $p < .10$ (two-tailed)

* $p < .05$

** $p < .01$

Table 10

Correlations between Bayley Raw Scores and Direction and Amount of Change in Attachment Scores from Age 1 to Age 2

(a)

Mother-Directed Behaviors

		Touch Change	Prox. Change	Look Change	Voc. Change
Bayley Raw Scores	Boys (10)	-.29	-.54	.41	.31
	Girls (8)	-.13	-.09	.72*	-.62
	Total (18)	-.29	-.40	.45*	.16

(b)

Father-Directed Behaviors

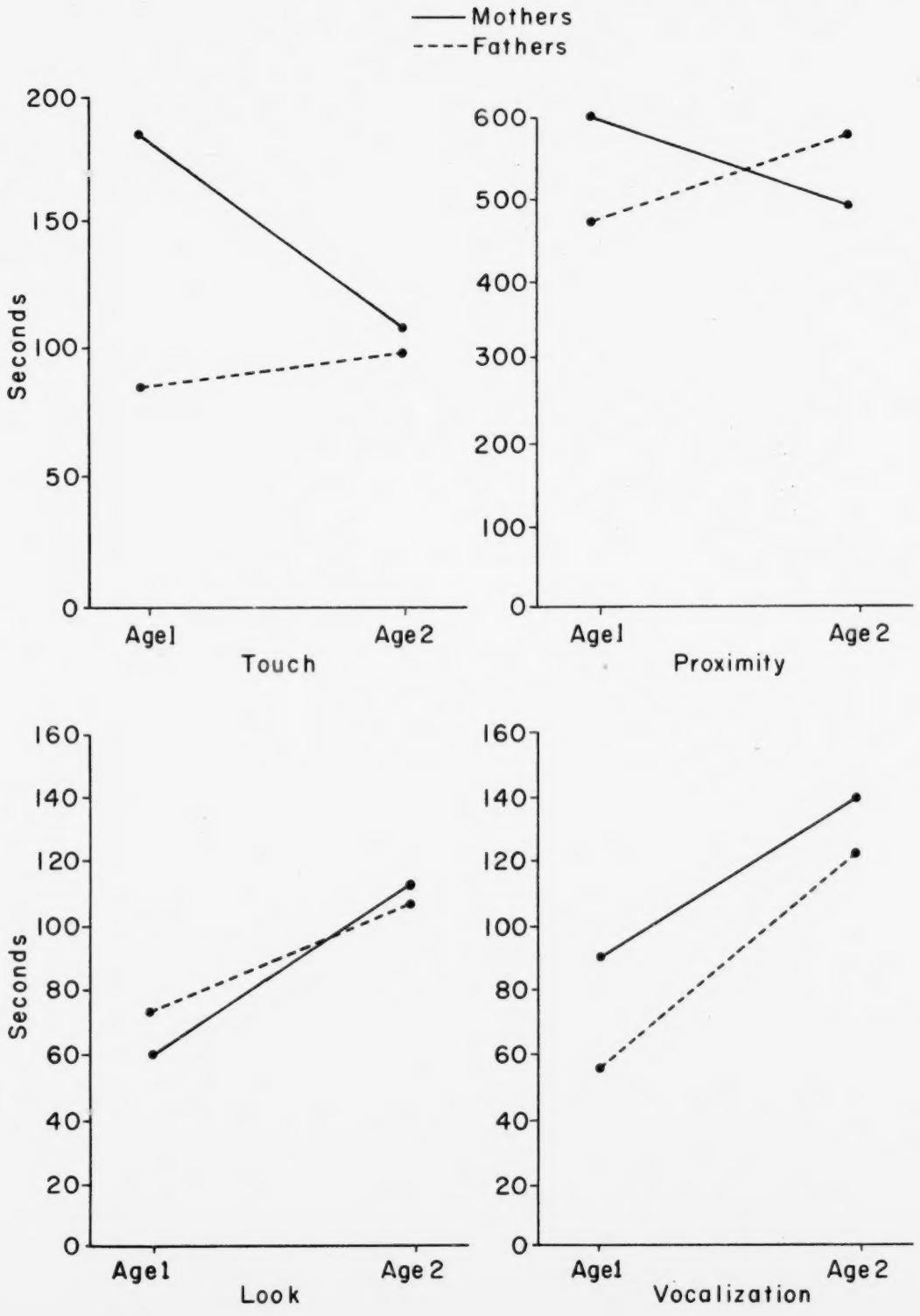
		Touch Change	Prox. Change	Look Change	Voc. Change
Bayley Raw Scores	Boys (10)	-.19	-.41	.21	.24
	Girls (8)	-.18	-.19	.15	.63
	Total (18)	-.22	-.32	.21	.23

*$p < .05$

Figure Captions

Figure 1. The mean amount in seconds of touching, proximity seeking, looking and vocalizing to each of the parents at one and two years.

Figure 2. The amount of touching and looking in seconds to mothers and fathers at one and two years.


Mothers
Fathers
Seconds
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150
100
50
0
Age1
Age2
Touch
600
500
400
300
200
100
0
Age1
Age2
Proximity
160
140
120
100
80
60
40
20
0
Seconds
Age1
Age2
Look
160
140
120
100
80
60
40
20
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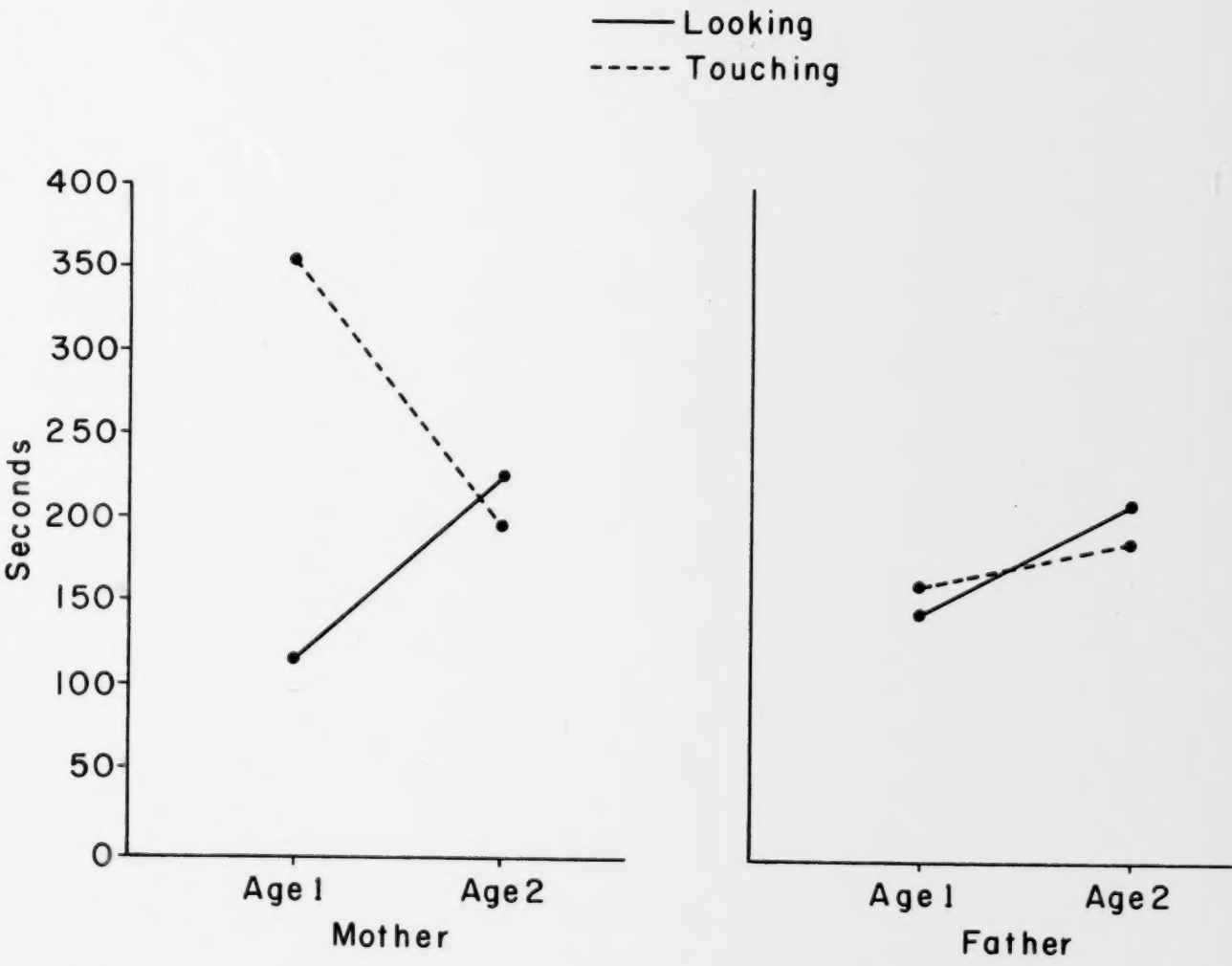
Age1
Age2
Vocalization


Looking
Touching
400
350
300
250
200
150
100
50
0
Seconds
Age 1
Age 2
Mother
Age 1
Age 2
Father